

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Park, C.

SERIAL No. Unassigned

EXAMINER: Unassigned

FILED: Herewith

GROUP No.: Unassigned

TITLE: AN ELECTRO-MODULATING DEVICE

Attorney Docket No.: 30001035 US-02

Commissioner for Patents  
Washington, D.C. 20231

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January 14, 2002  
(Date of Deposit).

Allison Berkman  
Name

Allison Berkman  
Signature

**PRELIMINARY AMENDMENT**

Dear Sir:

Please amend the application as follows:

In The Specification

Please amend the specification as follows:

On page 1, at line 2, insert -- Background of the Invention--

-- 1. Field of the Invention --.

On page 1, at line 7, insert --2. Discussion of the Background Art --.

On page 1, at line 24, insert --Summary of the Invention--.

On page 6, at line 29, insert --Brief Description of the Drawings--.

On page 7, at line 23, insert -- Detailed Description of the Invention--.

In The Abstract

Please amend the abstract as follows:

An electro-modulating device for modulating light from a light source, as part of an opto-electronic communication network has a modulating medium for modulating light passing therethrough by varying an electric field applied across the modulating medium, an optical input-output surface, a light reflector, and electrodes for applying the varying electric field across the modulating medium. The input-output surface, the medium and the reflector are arranged so that light enters the medium through the input-output surface, travels through the medium towards the reflector, is reflected by the reflector to travel back through the medium towards the input-output surface, and exits the medium through the input-output surface. The electric field is transverse to light traversing the medium between the input-out surface and the reflector, to make it easier to couple an optic fibre to the input-output surface of the modulating medium.

In The Claims

Please amend the claims as follows:

1. (Amended) An electro-modulating device comprising a modulating element, the modulating element having a modulating medium for modulating light passing therethrough, an optical input-output surface by which light both enters the medium prior to modulation of the light and exits the medium after modulation of the light, a light reflector, and electrodes for applying an electric field across the modulating medium, wherein:

the input-output surface, the medium and the reflector are arranged so that light enters the medium through the input-output surface, travels through the medium towards the reflector, is reflected by the reflector to travel back through the medium towards the input-output surface, and exits the medium through the input-output surface;

the electric field is transverse to the direction of propagation of light traversing the medium between the input-output surface and the reflector; and

the refractive index of the medium is responsive to the applied electric field so that the intensity and/or phase of the light exiting the input-output surface is dependent on the applied electric field.

2. (Amended) An electro-modulating device as claimed in Claim 1, wherein the modulating element is formed from a section of semiconductor wafer and the modulating medium is formed from an active layer on or in the semiconductor wafer, the active layer having a plurality of edges and the input-output surface residing on an edge of the active layer.

3. (Amended) An electro-modulating device as claimed in Claim 2, wherein the modulating medium is an active layer situated between a first layer of conducting semiconductor and a second layer of conducting semiconductor, the first and second layers of conducting semiconductor forming the electrodes for applying a bias across the modulating medium.

4. (Amended) An electro-modulating device as claimed in Claim 2, wherein the electro-modulating device has a mounting surface on which there is mounted the modulating element.

5. (Amended) An electro-modulating device as claimed in Claim 4, wherein the mounting surface has securing means for securing the end portion of an optic fibre such that light from the fibre can be coupled into and out of the modulating medium through the input-output surface.

6. (Amended) An electro-modulating device as claimed in Claim 5, wherein the mounting surface is formed from a silicon substrate having a V-groove etched thereon for receiving the end portion of an optic fibre.

7. (Amended) An electro-modulating device as claimed in claim 4, wherein the mounting surface has a light guide formed thereon for guiding light into and out of the modulating element.

8. (Amended) An electro-modulating device as claimed in Claim 7, wherein the light guide and modulating medium are formed from a continuous layer of semiconductor.

9. (Amended) An electro-modulating device as claimed in claim 1, wherein the modulating element has at least one end wall and the reflector is formed by at least one layer of reflective material deposited on the end wall of the modulator element.

10. (Amended) An electro-modulating device as claimed in claim 2, wherein the modulating medium is formed from a layer of InGaAsP, and each electrode is formed from a layer of conducting InP.

**Remarks**

Claims 1-10 remain in the application.

The specification has been amended to include headings consistent with U.S. practice.

The Abstract of the Disclosure has been amended to eliminate reference numbers and to comply with MPEP 608.01(b).

Claims 1-10 have been amended to eliminate reference numbers and any multiple dependencies.

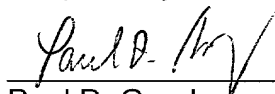
As such, claims 1-10 have been clarified by amendment for purposes of form. It is respectfully submitted that the amendments to claims 1-10 are neither narrowing nor made for substantial reasons related to patentability as defined by the Court of Appeals for the Federal Circuit (CAFC) in Festo Corporation v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd., 95-1066 (Fed. Cir. 2000). Therefore, the amendments to claims 1-10 do not create prosecution history estoppel and, as such, the doctrine of equivalents is available for all of the elements of claims 1-10.

Consideration and allowance of the application is respectfully requested.

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings to Show Changes Made."

Respectfully submitted,

1-11-02  
Date

  
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Specification

Please amend the specification as follows:

On page 1, at line 2, insert -- Background of the Invention--

-- 1. Field of the Invention --.

On page 1, at line 7, insert --2. Discussion of the Background Art --.

On page 1, at line 24, insert --Summary of the Invention--.

On page 6, at line 29, insert --Brief Description of the Drawings--.

On page 7, at line 23, insert -- Detailed Description of the Invention--.

In The Abstract

Please amend the abstract as follows:

[This relates to an] An electro-modulating device [(10)] for modulating light from a light source, as part of an opto-electronic communication network[. The electro-modulating device (10)] has a modulating medium [(16)] for modulating light passing therethrough by varying an electric field applied across the modulating medium [(16)], an optical input-output surface [(21)], a light reflector [(28)], and electrodes [(15,17)] for applying the varying electric field across the modulating medium [(16)]. The input-output surface [(21)], the medium [(16)] and the reflector [(28)] are arranged so that light enters the medium [(16)] through the input-output surface [(21)], travels through the medium [(16)] towards the reflector [(28)], is reflected by the reflector [(28)] to travel back through the medium [(16)] towards the input-output surface [(21)], and exits the medium [(16)] through the input-output surface [(21)]. The electric field is transverse to light traversing the medium [(16)] between the input-out surface and the reflector [(28)], to make it easier to couple an optic fibre to the input-output surface [(21)] of the modulating medium [(16)].

[Figure 1]

In The Claims

Please amend the claims as follows:

1. (Amended) An electro-modulating device [(10)] comprising a modulating element [(14)], the modulating element [(14)] having a modulating medium [(16)] for modulating light passing therethrough, an optical input-output surface [(21)] by which light both enters the medium [(16)] prior to modulation of the light and exits the medium [(16)] after modulation of the light, a light reflector [(28)], and electrodes [(15,17)] for applying an electric field across the modulating medium [(16)], wherein:

the input-output surface [(21)], the medium [(16)] and the reflector [(28)] are arranged so that light enters the medium through the input-output surface [(21)], travels through the medium [(16)] towards the reflector [(28)], is reflected by the reflector [(28)] to travel back through the medium [(16)] towards the input-output surface [(21)], and exits the medium through the input-output surface [(21)];

the electric field is transverse to the direction of propagation of light traversing the medium [(16)] between the input-output surface and the reflector [(28)]; and

the refractive index of the medium [(16)] is responsive to the applied electric field so that the intensity and/or phase of the light exiting the input-output surface [(21)] is dependent on the applied electric field.

2. (Amended) An electro-modulating device [(10)] as claimed in Claim 1, wherein the modulating element [(14)] is formed from a section of semiconductor wafer [(40,15,16,17)] and the modulating medium [(16)] is formed from an active layer [(16)] on or in the semiconductor wafer, the active layer [(16)] having a plurality of edges [(20,22)] and the input-output surface [(21)] residing on an edge [(20)] of the active layer.

3. (Amended) An electro-modulating device [(10)] as claimed in Claim 2, wherein the modulating medium [(16)] is an active layer situated between a first layer of conducting semiconductor [(15)] and a second layer [(17)] of conducting semiconductor, the first and second layers of conducting semiconductor forming the electrodes [(15,17)] for applying a bias across the modulating medium [(16)].

4. (Amended) An electro-modulating device [(10)] as claimed in Claim 2 [or Claim 3], wherein the electro-modulating device [(10)] has a mounting surface [(41)] on which there is mounted the modulating element [(14)].

5. (Amended) An electro-modulating device [(10)] as claimed in Claim 4, wherein the mounting surface [(41)] has securing means [(43)] for securing the end portion [(11)] of an optic fibre [(12)] such that light from the fibre [(12)] can be coupled into and out of the modulating medium [(16)] through the input-output surface [(21)].

6. (Amended) An electro-modulating device [(10)] as claimed in Claim 5, wherein the mounting surface [(41)] is formed from a silicon substrate having a V-groove [(42)] etched thereon for receiving the end portion [(11)] of an optic fibre [(12)].

7. (Amended) An electro-modulating device [(10)] as claimed in [any one of Claims 4 to 6] claim 4, wherein the mounting surface has a light guide [(52a,52b)] formed thereon for guiding light into and out of the modulating element [(14)].

8. (Amended) An electro-modulating device [(10)] as claimed in Claim 7, wherein the light guide [(52a)] and modulating medium [(16b)] are formed from a continuous layer of semiconductor [(16)].

9. (Amended) An electro-modulating device [(10)] as claimed in [any previous] claim 1, wherein the modulating element [(14)] has at least one end wall [(22)] and the reflector [(28)] is formed by at least one layer of reflective material [(26)] deposited on the end wall [(22)] of the modulator element.

10. (Amended) An electro-modulating device [(10)] as claimed in [any of Claims 2 to 9] claim 2, wherein the modulating medium [(16)] is formed from a layer of InGaAsP, and each electrode is formed from a layer of conducting InP.